

## AN ULTRA WIDE-BAND COMMUNICATION SYSTEM AND METHOD

### ABSTRACT OF THE DISCLOSURE

An impulse radio communications system using one or more subcarriers to communicate information from an impulse radio transmitter to an impulse radio receiver. The impulse radio communication system is an ultrawide-band time domain system. The use of subcarriers provides impulse radio transmissions added channelization, smoothing and fidelity. Subcarriers of different frequencies or waveforms can be used to add channelization of impulse radio signals. Thus, an impulse radio link can communicate many independent channels simultaneously by employing different subcarriers for each channel. The impulse radio uses modulated subcarrier(s) for time positioning a periodic timing signal or a coded timing signal. Alternatively, the coded timing signal can be summed or mixed with the modulated subcarrier(s) and the resultant signal is used to time modulate the periodic timing signal. Direct digital modulation of data is another form of subcarrier modulation for impulse radio signals. Direct digital modulation can be used alone to time modulate the periodic timing signal or the direct digitally modulated the periodic timing signal can be further modulated with one or more modulated subcarrier signals. Linearization of a time modulator permits the impulse radio transmitter and receiver to generate time delays having the necessary accuracy for impulse radio communications.